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STERNE, KESSLER, GOLDSTEIN & FOX PLLC
1100 NEW YORK AVENUE, N.W., SUITE 600
WASHINGTON, DC 20005-3934

EXAMINER

MEHRPOUR, NAGHMEH

ART UNIT PAPER NUMBER

2685

DATE MAILED: 07/31/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary

Application No.
09/476,092

Applicant(s)
David F. Sorrells et al.

Examiner
Naghmeh Mehrpour

Art Unit
2685



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on _____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 4, 6 6) ☐ Other:

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Information Disclosure Statement

1. The information disclosure statement filed reference listed in the information Disclosure submitted on 1/11/02, 6/4/02 have been considered by the examiner (see attached PTO-1449).

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. ~~Claims 1-6, 9, 11-13, 25-28~~ **Claims 1-6, 9-28**, are rejected under 35 U.S.C. 102(b) as being anticipated by Pace et al. (US Patent Number 5,606,731).

Regarding **Claim 1**, Pace teaches method for down-converting a frequency modulated (FM) signal, comprising (See figure 1) the steps of (1) aliasing 16 the FM signal 14 at an aliasing rate, said aliasing rate being determined by the frequency of the FM signal; (2) adjusting said aliasing rate 50 to compensate for frequency changes of the FM signal; and (3) outputting, responsive to steps (1) and (2), a demodulated baseband information signal 36.

Regarding **Claims 3, 11, 15**, Pace teaches adjusting the aliasing rate in accordance with frequency changes of FM signal 14 to maintain the aliasing rate substantially equal to the frequency of the FM signal. Another word the first aliasing/Mixer 18 receives an FM signal 14 and first LO 17 signal. The first LO 17 signal is substantially equal to the frequency of FM signal 14 or a sub-harmonic thereof. The first aliasing/mixer 18 uses the first LO 17 signal to down-convert the FM

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signal 14 to a first downconverted signal Q. As long as an aliasing rate remains substantially equal to the frequency of an FM signal 14, the result down-converted signal is substantially a constant level. In the case of zero IF FM receiver circuit 11, the first and second down-converted signals I and Q should generally be constant. The frequency of first local oscillator signal is for example, 150 MHZ, in the case of a VHF selective call receiver. Since 150 MHZ frequency is a FM frequency. Therefore Pace does teaches a method wherein step (1) comprises: aliasing the FM signal I at an aliasing rate that is substantially equal to a frequency of the FM signal (col 2 lines 40-67, col 3 lines 1-18).

Regarding **Claims 4, 17**, Pace teaches a method further comprising the step of compensating for phase delays to maintain bandwidth and stability (col 2 lines 62-67).

Regarding **Claims 6, 12, 19, 20, 22-24, 26-27**, Pace teaches a method for directly down converting 16 a frequency modulated (FM) signal 14 having a carrier frequency, comprising the steps of: (1) aliasing 18 the FM signal 14 with a first local oscillator 17 (LO) signal to create a first down-converted signal (col 2 lines 51-56) , said first LO 17 signal having a first LO frequency and a first LO phase (col 2 lines 56-61); (2) aliasing 16 the FM signal with a second LO signal to create a second down-converted signal, said second LO signal having a second LO frequency and a second LO phase 20, wherein said second LO frequency is substantially the same as said first LO frequency, and wherein said second LO phase is shifted relative to said first LO phase (col 2 lines 50-67, col 3 lines 1-19) combining said first down-converted signal and said second down- converted signal to create a summation 32 signal (col 3 lines 5-17); (4) integrating

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said summation signal to create a control signal 34, (5) creating an aliasing signal from said control signal (col 3 lines 19-33); and outputting, responsive to steps (1)-(5), a demodulated 36 baseband information signal.

Regarding **Claims 5, 9, 15, 18, 28**, Pace teaches a method wherein step (5) comprises: (a) compensating for phase delays to maintain stability by adjusting said control signal to create a compensated control signal (see figure 1 numeral 50); and (b) creating said aliasing signal using said compensated control signal (col 4 lines 1-35).

Regarding **Claim 21**, Pace teaches a method wherein step (4) comprises the step of: adjusting said control signal to maintain said summation 32 signal at a value substantially equal to zero (col 7 lines 10-43).

Regarding **Claim 25**, Pace teaches a down-converter further comprising: a loop compensation module 50 coupled to said integrator 34 and said voltage controlled oscillator 17 (col 3 lines 15-33).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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5. **Claims 2, 10, 14,** are rejected under 35 U.S.C. 103(a) as being unpatentable over Pace (US Patent 5,606,731).

Regarding **Claims 2, 10, 14,** Pace does not specifically teach wherein step (1) comprises: aliasing the FM signal 14 at an aliasing rate that is substantially equal to a sub-harmonic of a frequency of the FM signal. However Pace teaches adjusting the aliasing rate in accordance with frequency changes of FM. signal 14 to maintain the aliasing rate substantially equal to the frequency of the FM signal. Another word the first aliasing/Mixer 18 receives an FM signal 14 and first LO 17 signal. The first LO 17 signal is substantially equal to the frequency of FM signal 14 or a sub-harmonic thereof. The first aliasing/mixer 18 uses the first LO 17 signal to down-convert the FM signal 14 to a first downconverted signal Q. As long as an aliasing rate remains substantially equal to the frequency of an FM signal 14, the result down-converted signal is substantially a constant level. In the case of zero IF FM receiver circuit 11, the first and second down-converted signals I and Q should generally be constant. One of the down converted signals I or Q is a constant level above DC while the other down-converted signal is a constant level below DC. The sum of I signal and Q signal is thus substantially zero. Summation of the down-converted signal signals I and Q is performed by a summer 32. When summation 32 signal tends away from zero, it shows that the FM frequency 14 is changing. The summation signal input to the Automatic frequency control AFC signal processor 50 (see figure 1) using carrier recovery circuit 43, AFC error generation circuit and low pass filter 51. The carrier frequency circuit 43 in AFC signal processor 50 drives the direct current DC voltage that corresponds to the IF carrier center frequency, by

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using a simple RC low pass filter. The output of the carrier recovery circuit 44 compares the output of the carrier recovery circuit 43 with voltage reference 40 and generates a AFC error signal which is applied to the low pass filter 51. The output of the processor 50 control the frequency of the first local oscillator 17. The processor 50 maintains the control signal at a level necessary to insure that the FM signal 14 is aliased at a sub-harmonic of the FM signal- even as the FM signal 14 changes frequency (col 2 lines 40-67 col 3 lines 1-18 , lines 49-67, col 4 lines 1-15). Therefore, adjusting and simply to change aliasing rate be equal to sub-harmonic of frequency, it would have been obvious to ordinary skill in the art at the time the invention was made to provide above teaching to Pace, in order to select the frequency be best suit the needs of the circuit for noise reduction and producing better quality circuit.(col 2 lines 40-67 col 3 lines 1-18).

6. **Claims 7-8**, are rejected under 35 U.S.C. 103(a) as being unpatentable over Pace (US Patent 5,606,731) in view of Mishima et al (US Patent Number 5,600,680).

Regarding **Claims 7-8**, Pace teaches a method wherein said second LO phase is shifted relative to said first LO phase by an amount that is substantially equal to one-half period of the FM signal.

Pace does not shown that second LO phase shift relative to the first LO by amount of one-quarter. However Mishima shows that second LO phase is shifted relative to said first LO phase by an amount that is substantially equal to one-quarter period of the signal (See figure 1, numerals 12, 15). Therefore, it would have been obvious to ordinary skill in the art at the time the invention was made to use one-half or one-quarter or equal to any multiple of a period of the FM

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signal plus one-quarter period of the FM signal, in order to provide zero-IF receiver circuit that eliminate the time delay.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Ripley et al. (US Patent 5,870,670) disclose integrated image reject mixer

Mohindra (US Patent 6,314,279) disclose frequency offset image rejection

Williams (US Patent Number 4,470,145) disclose single Sideband Quadricorreclator

deBuda et al.(US Patent Number 4,384,357) disclose self-synchronization circuit for a FFSK or MSK demodulator

8. **Any responses to this action should be mailed to:**

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 872-9314, (for formal communications indented for entry)

Or:

(703) 308-6306, (for informal or draft communications, please label

“PROPOSED” or “DRAFT”)

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Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, Va., sixth Floor (Receptionist).

Any inquiry concerning this communication or earlier communication from the examiner should be directed to Melody Mehrpour whose telephone number is (703) 308-7159. The examiner can normally be reached on Monday through Thursday (first week of bi-week) and Monday through Friday (second week of bi-week) from 6:30 a.m. to 5:00 p.m.

If attempt to reach the examiner are unsuccessful the examiner's supervisor, Edward F. Urban can be reached (703)305-4385.

NM

July 22, 2002


EDWARD F. URBAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600